IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant:	MARKUS HARTMANN and HELMUT JAROSCH
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For:	METHOD FOR THE PRODUCTION OF A THERMOPLASTIC BOARD COMPRISING AT LEAST ONE SMOOTH EDGE, DEVICE THEREFORE, AND EDGE MACHINING SYSTEM
Art Unit:	1791
Examiner:	Stella Kim Yi
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PREAPPEAL CONFERENCE REQUEST

Sir:

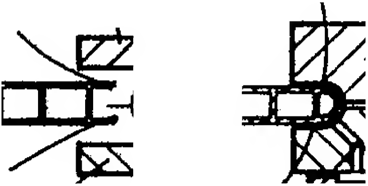
Claims 1-2 and 4 are rejected under 35 U.S.C. 1 03(a) as being unpatentable over Bressan (EP 0303576) and in view of Day (5,589,243).

The present invention relates to a method of forming a thermoplastic foam core sheet having a smooth skin on both faces, which is later processed to have a smooth dense shell on an edge, formed without softening an adjacent portion of the sheet by simultaneously heating the edge to a melting temperature while cooling the adjacent areas below a softening temperature. The result is a foam core sheet which has a smooth edge, which is formed in two operations, and thus permits arbitrary width, edge-finished panels to be formed.

Foam core panels are known in the art, but the art is deficient in processes for forming smooth edges on arbitrary width panels. Such structures are suitable as insulating panels, since air flow is impeded by the foam nature. Day provides an example of such panels.

Bressan relates to a method and apparatus for thermoforming "semifinished" products extruded in the form of continuous alveolate sheets. An alveolate sheet has a pair of faces formed of thermoplastic, with parallel bridging spacers perpendicular across the space between the

sheets. Therefore, the alveolate sheet has continuous air channels across the entire width of the sheet, and a direct air space between faces of the sheet, resulting in poor insulating properties. The process of Bressan forms an edge on the sheet by deforming a U-shaped edge while heating the legs of the U, and bridging the edges by fusing the thermoplastic legs. See Figs. 6 and 7 or Bressan:



The process of Bressan thus fails to teach or suggest at least "heating the side edge of the plastic web in a guide groove of a smoothing device to at least a melting temperature of the thermoplastic synthetic material following calibration, while pressing the contact surface of the smoothing device against the-side edge to **smooth and densify** the thermoplastic synthetic material, thereby **to smooth and seal the side edge of the coarsely porous core** while **simultaneously maintaining adjacent peripheral surface areas of the plastic web in the smoothing device at a temperature below the softening temperature of the thermoplastic synthetic material by cooling**."

Bressan discloses a method of closing the edges of a "continuous, aveolate sheet or panel". Applicants' "integral foam board" on the other hand, is formed of a plastic material having a "coarsely porous core"-- that is, a solid material with numerous tiny closed cell pores -- and side surfaces which are sealed and smoothed during the manufacturing process to form a skin. Bressan forms a smooth edge by **deflecting** the free edges of the surfaces toward each other and fusing the edges. The present claims encompass smoothing and densifying the side edges of the plastic foam board, in a process which does not deflect the opposing surfaces, so much as reform the rectangular edge with an exposed foam into a sealed, curved edge.

According to claim 1, a side edge surface is smoothed while simultaneously cooling the main surfaces of the board on either side. Bressan not only relates to a different type of plastic sheet, but also calls for a two-step process of treating an edge.

In order to employ Day in the process of Bresson, the core of the Day board would have to be hollowed out, in order to form the open cavities which Bresson seeks to close by **deflection** of the opposing surfaces. Likewise, the open cavities of the alveolar panel of Bresson provide a thermally-insulating air volume which impedes softening of thermoplastic surfaces distant from the heated surface, thus reducing a need for the simultaneous heating and cooling as provided in accordance with the present claims to avoid deformation of the panel.

Bresson specifically teaches:

> According to the method and the apparatus of this invention the thermoforming assemblies are on line with the extrusion machine and provide first the softening of the peripheral edges which have been suitably cut and trimmed and then the junction thereof, thus forming the peripheral edges of a plurality of sheets subjected to said thermoforming action.
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> As mentioned before, in order to avoid that the alveolate cavities of sheet 1 communicate with the outside the socalled "canes" should be closed by a thermoforming process acting on the side edges of the extruded sheet. In Figg. 2, 3 and 11 there is shown a cutting and thermoforming station for the side edges of alveolate sheet 1. Sheet 1 is cut by blades 34 and 34 min at the entrance into the cutting and thermoforming station. Blade 34 longitudinally cuts sheet 1 along an axis thereof, and blades 34 min , as shown also in Fig. 5, cut and trim the edges of sheet 1, **thus eliminating the selvedge which is deformed by thermal effect upon the extrusion, in order to provide two correctly aligned side edges which will be closed by the thermoforming assemblies**. Sheet 1 is then passed about first deflecting rollers 32.The two halves of sheet 1 longitudinally cut by blade 34 are conveyed upwards and downwards, respectively, and passed about second deflecting rollers 33. Afterwards the cut edges of sheet 1 are subjected to a thermal action by assembly 6 which through electrical resistance 8 protected by insulator 9 produces heat which is irradiated through flanges 10 and 10 min and softens edges 4 and 4 min of sheet 1 guided between skids 11 and 11 min in which cooling water fed through conduits 41 is circulated. Sheet 1 is then passed along forming assembly 12, better shown in Fig. 7, which by means of its shaped sections 13 and 13 min joins by contact softened edges 4 and 4 min , thus closing the side edge of alveolate sheet 1.The alternative embodiment of Fig.8 shows assembly 12 provided with ducts 14 and 15 conveying cooling air from duct 35 towards sheet 1 so that the heating action of assembly 6 does not impair the evenness of sheet surfaces and the alveolate cavities adjacent to the outer edge to be treated. According to this embodiment assembly 12 is formed of two specular halves 12a and 12b, the distance of which can be adjusted in order to adapt forming assembly 12 to the different thickness of the semifinished product 1.
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> In Fig. 12 and 13 another embodiment of deflection station for alveolate sheet 1 is shown. This arrangement allows a pair of deflection rollers to be eliminated by arranging thermoforming assemblies 6, 12 along an oblique path of sheet 1 which after being cut is deflected by rollers 32 min and conveyed at an angle upwards and downwards. Sheet 1 is subjected to thermoforming treatment along the oblique path as above described and then deflected again by rollers 33 min and 32 min.

Thus, it is clear that Bressan provide that the edge is formed by a deflection and fusion of a spaced pair of surfaces, while the present invention provides that the edge is formed by a densification and smoothing of the edge, without collapsing an empty space. This difference is critical, and amounts to a failure of Bressan in view of Day to present a prima facie case of obviousness. Likewise, because Bressan teaches that the opposing surfaces are to be heated to a softening temperature and deflected, it teaches against the present invention which smoothes and densifies an edge of a foam core panel while simultaneously cooling adjacent peripheral surface areas.

Day discloses a rigid foam board. However, Day teaches away from the applicants' method for smoothing and sealing a side edge. In particular, as shown in Fig. 33, the side surfaces 375 of the rigid, closed cell expanded foam board 370 are formed by "fiberglass skins" (Column 16, lines 23-33). A resin, which is preferably injected into the fiberglass skins, not only penetrates between the fibers of these skins but also between fibers of intermediate webs 372 that extend between the fiberglass surfaces 375. The fiberglass surfaces 375 and the intermediate webs 372 thus form a structure much like that of an aveolate sheet -- a sheet which is filled with a rigid plastic foam. Therefore, while Day does disclose plastic foam boards made of PVC, as described in Column 2, lines 33-36, these boards are sandwiched together with the absorptive fibrous web sheets to form laminated boards. Day fails to hint at the problem, or provide a solution to the problem, of porous edges which occur with an integrated foam board. In Column 7, lines 60-61, the passage cited by the Examiner, merely states that "when fiberous sheets 42 [sheets equivalent to side surfaces 375 in Fig. 33] are cut by a band saw, the cutting operation frays the longitudinal edges of the webs 62 [intermediate webs 372 in Fig. 33]." Thus it is the webs 62, not the porous core material, which is rough and unsightly. These frayed edges result only from the fibrous structure of the sheet material (fiberglass). The problems resulting from the rough cut edge of the coarse porous core foam board, are neither disclosed nor alleviated by the manufacturing process of Day, and clearly are not disclosed in, or remediated by, Bressan.

Therefore, a person of ordinary skill in the art would have received no assistance from Day in smoothing the rough edges of a plastic porous foam board. Conversely, the frayed edges of non-thermoplastic fibers of a sheet material in a sandwich panel of the type disclosed by Day could not possibly be smoothed, and, sealed, by the method according to the present invention.

Finally, if a person skilled in the art were to substitute the plastic porous foam as taught by Day for the thermoplastic material of Bressan, the result would be a reinforced sandwich panel made of a number porous plastic blocks, reinforced with a web of fibrous sheets. This structure would be completely different from the integral foam board of the present invention.

In summary, the patent to Day fails to mention the problems of sealing and smoothing the edges of an integral foam board. The panel disclosed by Day is coated with a separate "skin" to improve the strength and stability of the laminate (Column 8, lines 51-67). There is no hint or suggestion of smoothing and densifying the porous thermoplastic core itself.

It is therefore respectfully submitted that the rejection should be withdrawn.

Respectfully submitted,
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